

Working Group Summaries

Batting order:

- Weak Lensing Clusters
 - Theory/Joint Probes
 - Supernovae
 - Strong Lensing
 - Photo-z's
 - LSS
 - Clusters
-

Weak Lensing Report

Systematics

Systematics

Systematics

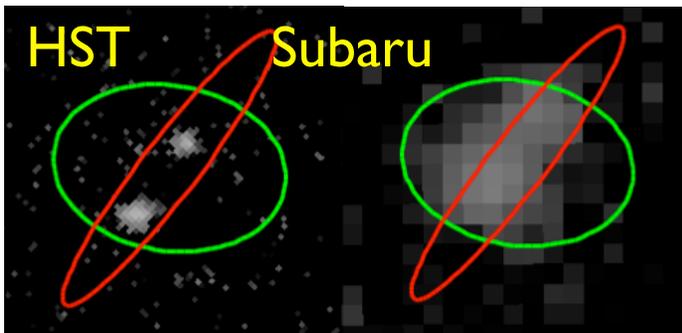
Systematics

Systematics

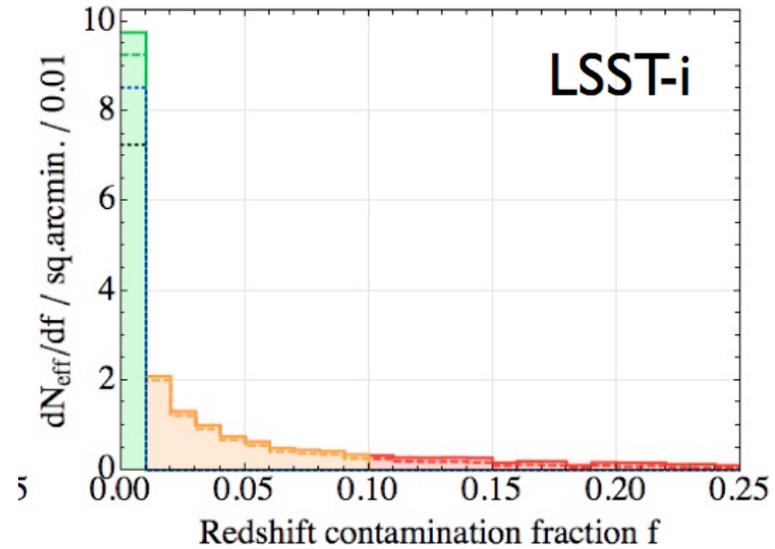
Weak Lensing Report

Deblending:

- Large fraction of objects will be blended.
- Most with different redshifts!



W. Dawson

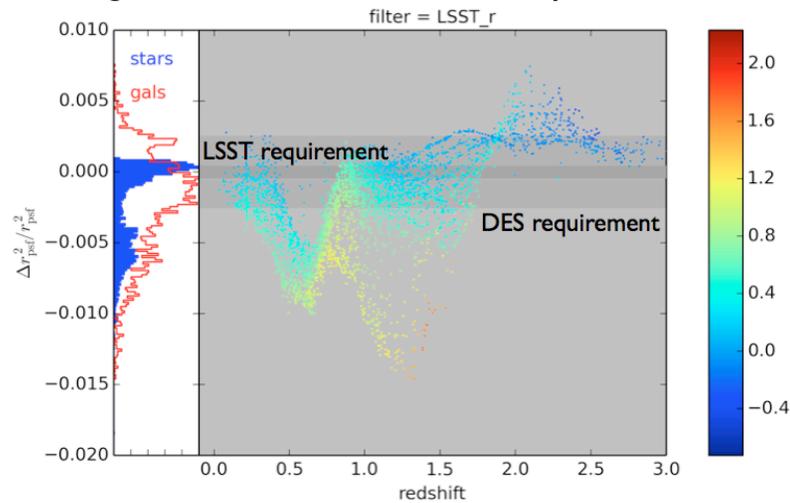


D. Kirkby

Weak Lensing Report

Chromaticity:

- The largest systematic so far is from the wavelength dependent PSF size.
- Haven't studied bulge + disk with different SEDs yet.

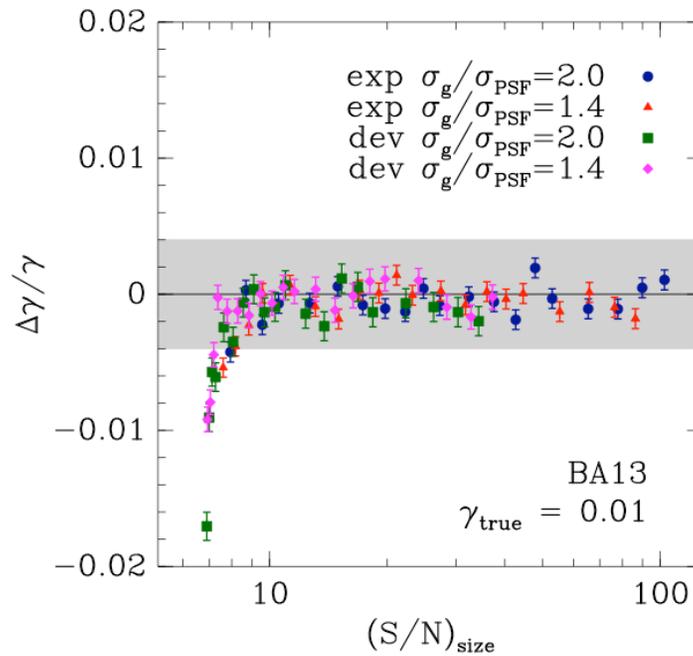


J. Meyers

Weak Lensing Report

Noise bias:

- Theoretically unbiased estimator still showing biases at low S/N.
- Smoother when considered a function of S/N of galaxy size.

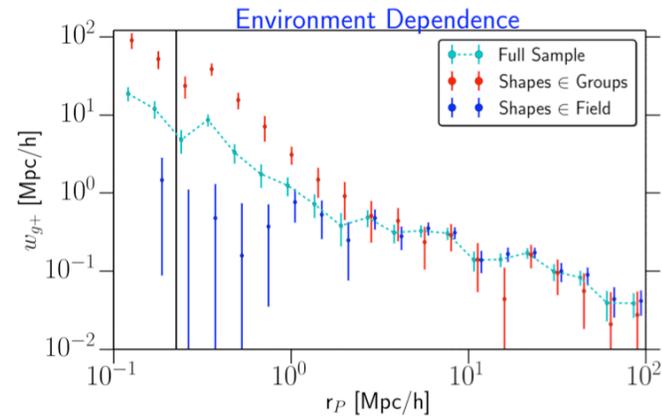
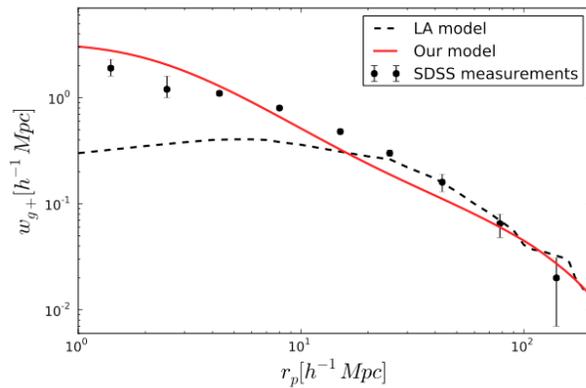


E. Sheldon

Weak Lensing Report

Intrinsic Alignments:

- Effect different on small scales for field vs group galaxies.
- Linear alignment model is also insufficient on small scales.



S. Singh

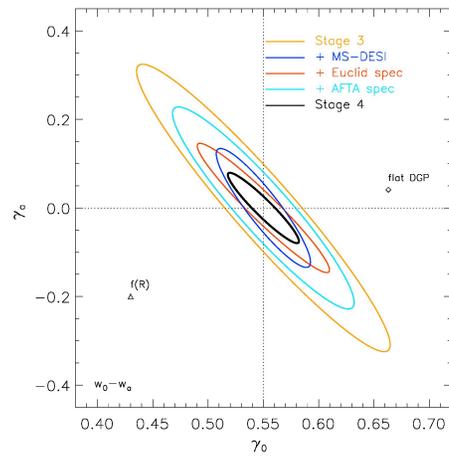
M. Schneider

Theory/Joint Probes WG Activities

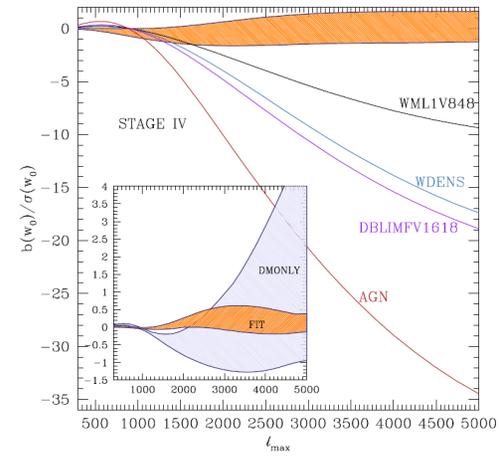
mainly H1 & H2

- Investigating modified gravity theories
- Testing gravity and dynamical dark energy with various probes and their combinations including those with spectroscopic surveys
- Mitigating systematics through cross-correlation clustering and lensing data, CMB lensing and weak lensing
- Studying impact of approximate likelihoods
- Modeling baryonic effects in large scale structure clustering

Theory/Joint Probes WG Activities

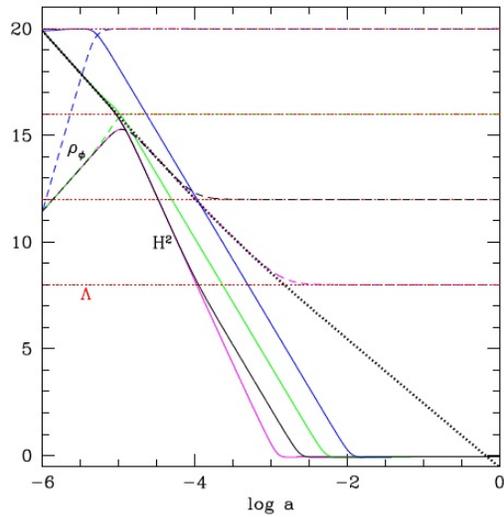


Forecast on γ & γ_a for various surveys
Mueller & Bean, in progress

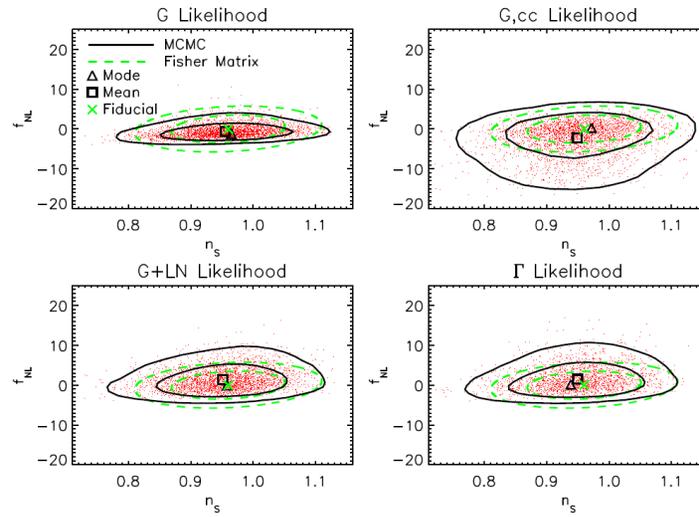


Bias in w_0 due to baryons
Zentner et al., PRD, 2013

Theory/Joint Probes WG Activities



Fab 5 grav cancels all components.
Linder, 1310.7597



Impact of Gaussian approx. on f_{NL} estimation
Sun, Wang & Zhan, ApJ, 2013

SN Working Group Is Focused on Photo-z and Calibration

- Eda Gjergo (ANL) writing up work filters, photo-z effects
- Rahul Biswas (ANL) modeling calibration effects
- Had very productive discussion with photo-z group
 - Will exchange sim galaxies and 2D PDFs (type,z)
 - Basis for further closer joint efforts
- Helpful discussions with CatSim on including SN in catalogs
- Helpful discussion with PhoSim on calibration + atm. simulations
- Fascinating talk on CCD features by Kirk Gilmore

Strong Lensing

Early TDC Results

Phil Marshall
DESC Meeting, Pittsburgh,
Thursday 12/6/2013

TDC overview: goals, plan

Goals:

1. Assess performance of current time delay estimation algorithms on LSST-like data (cf STEP in WL community)
2. Assess impact of universal cadence strategy on time delay estimation, and possibly recommend changes

Plan:

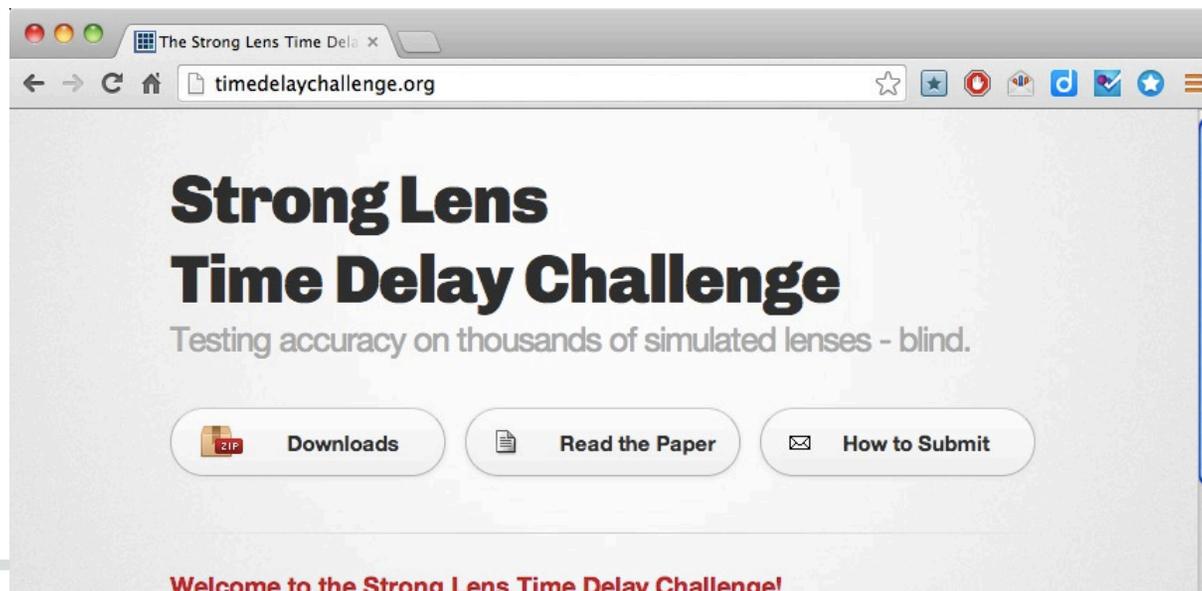
- “Evil Team” to generate large set of simulated lightcurves spanning expectations for Stage II-IV
- Challenge community “Good Teams” to infer time delays blindly, and submit results
- Publish paper on results together

Evil Team:

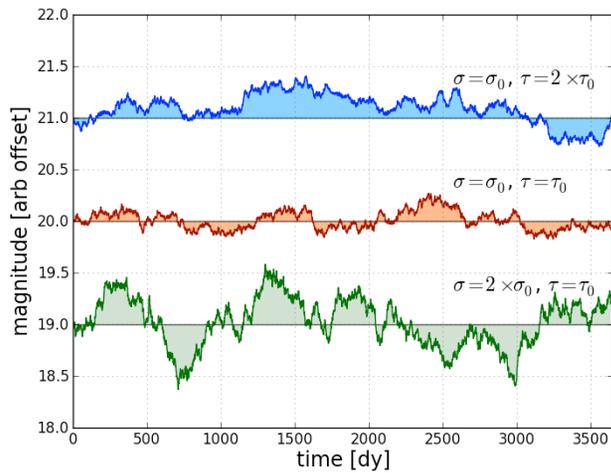
Kai Liao, Greg Dobler, Tommaso Treu (UCSB), Chris Fassnacht, Nick Rumbaugh (UCDavis), Phil Marshall (SLAC)

TDC overview: timeline

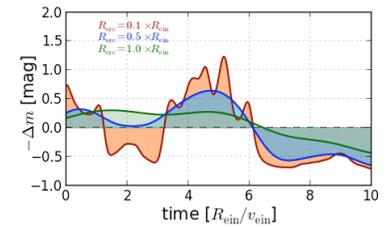
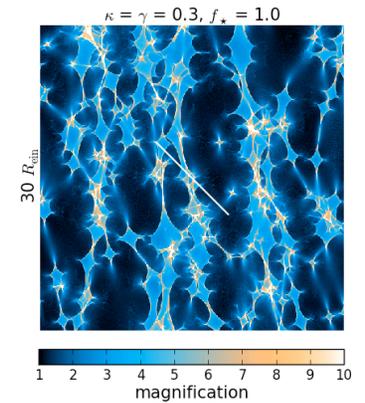
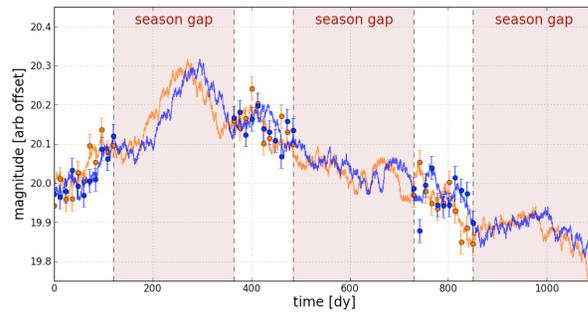
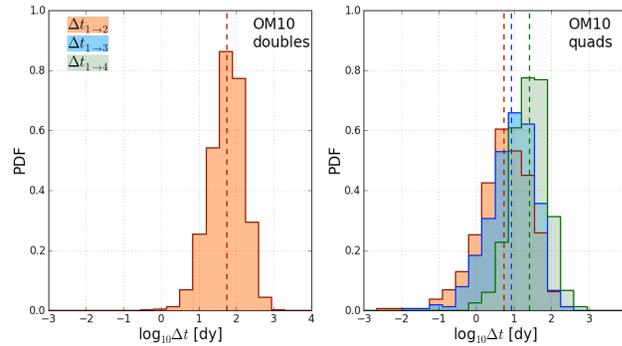
- Paper describing challenge: arXiv:[1310.4830](https://arxiv.org/abs/1310.4830)
- **TDC0** - small “training set,” to get Good Teams started: released Monday Oct. 21, soft deadline Sunday Dec. 1st
- **TDC1** - large “test set,” for primary analysis: released December 5 (!), hard deadline for submissions July 1
- Robotic TDC0 feedback ongoing until then



TDC ingredients



- SDSS Stripe 82 AGN variability
- LSST mock lensed AGN
- Microlensing
- “OpSim-ish” observations



Dobler

TDC0

- Ladder with 7 “rungs,” with wide variety of conditions to stress-test algorithms:
 - Cadence: 1 day, 2 week, and “opsim-ish”
 - 4, 12 month seasons
 - Noise model: constant Gaussian, and “opsim-ish”
 - 7 groups submitted entries so far, including COSMOGRAIL (Stage III via STRIDES) and 2 from stats/CS
 - Total no. of entries = 27 (multiple entries were encouraged)
 - Feedback from CS: *need large training sets*
 - Unblinded TDC1 data as training for blind TDC2?
-

TDC0: metrics

$$\chi^2 = \frac{1}{fN} \sum_i \left(\frac{\tilde{\Delta}t_i - \Delta t_i}{\sigma_i} \right)^2$$

$$P = \frac{1}{fN} \sum_i \left(\frac{\sigma_i}{|\Delta t_i|} \right)$$

$$A = \frac{1}{fN} \sum_i \frac{\tilde{\Delta}t_i - \Delta t_i}{|\Delta t_i|}$$

1. $f > 0.3$
2. $0.5 < \chi^2 < 2$
3. $P < 15\%$
4. $A < 15\%$

(1.09f)

(3%)

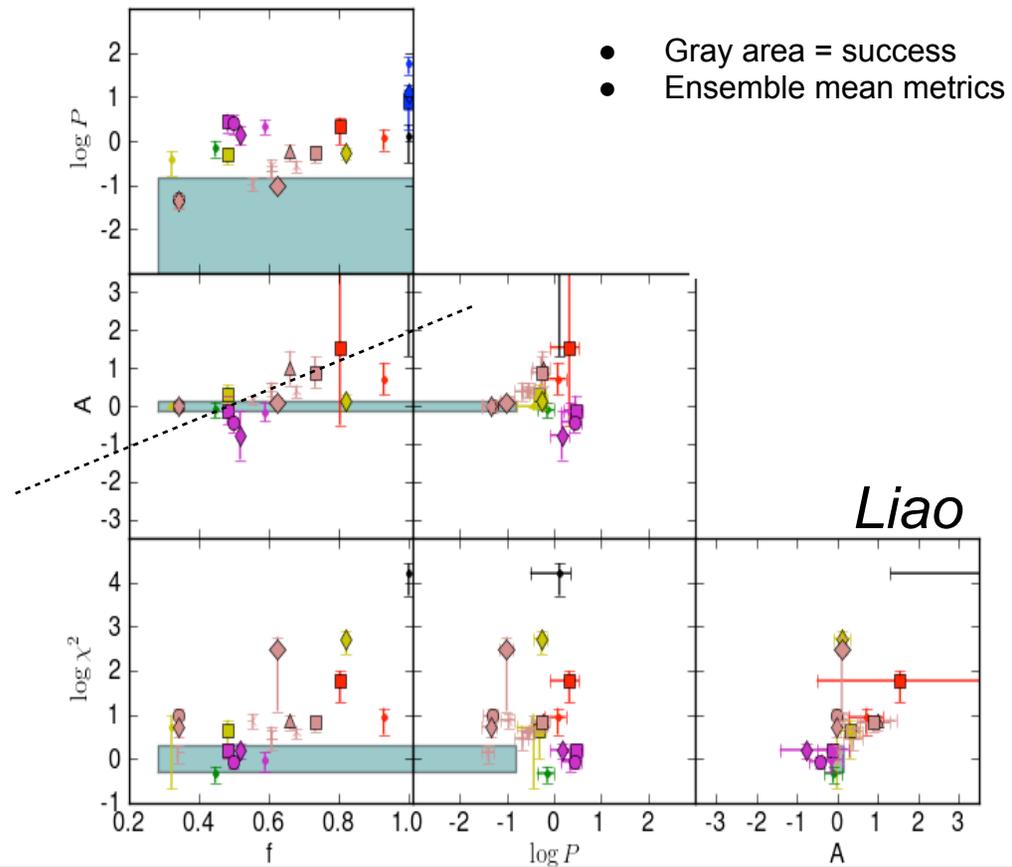
(0.2%)

- 4 metrics (chisq, A, P, f) used to define TDC0 pass
 - No leaderboard based on single metric
 - **LSST requirements** are stricter...
-

TDC0

2 out of 7 teams
passed
TDC0 at the first
attempt

Inaccuracy correlates
with success fraction:
outlier rejection is key



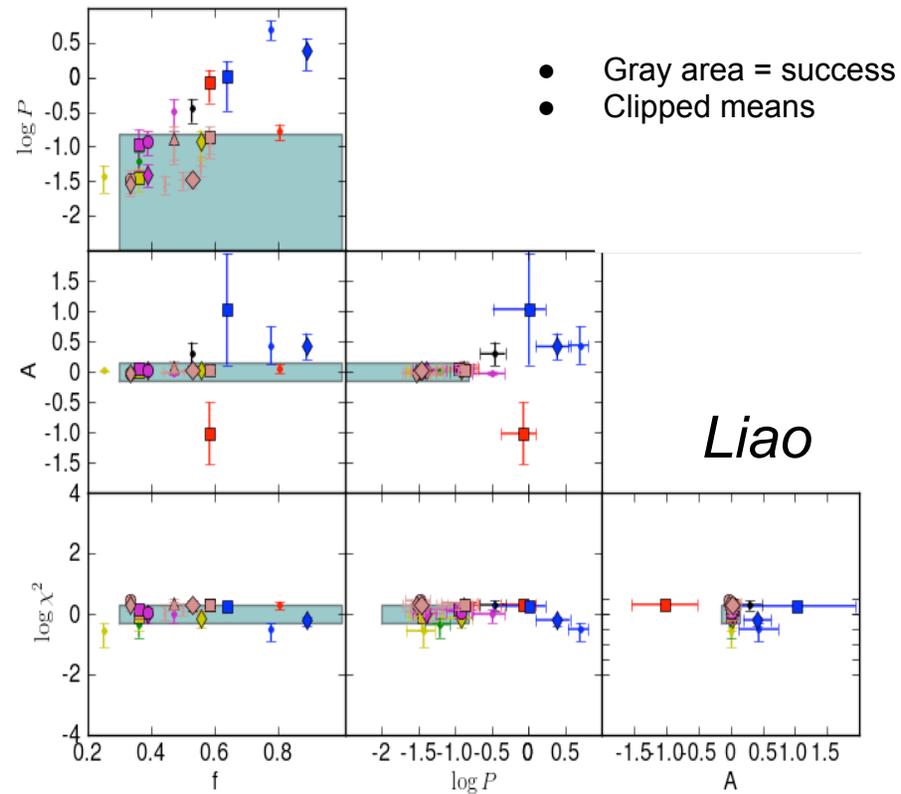
TDC0

(Magically)rejecting systems with:

- $dt < 10$ days
- $chisq > 10$

All but 2 teams would pass.

Their task:
reject outliers and
resubmit



TDC0: feedback

Robotically-generated feedback sent out yesterday (Treu, Liao):

- Provide Good Teams with:
 - raw statistics (mean and median)
 - statistics after cuts
 - Basic qualitative feedback (the same for everyone)
 - Pass/Fail
 - If pass, then password for TDC1
 - 2 teams passed so far
-

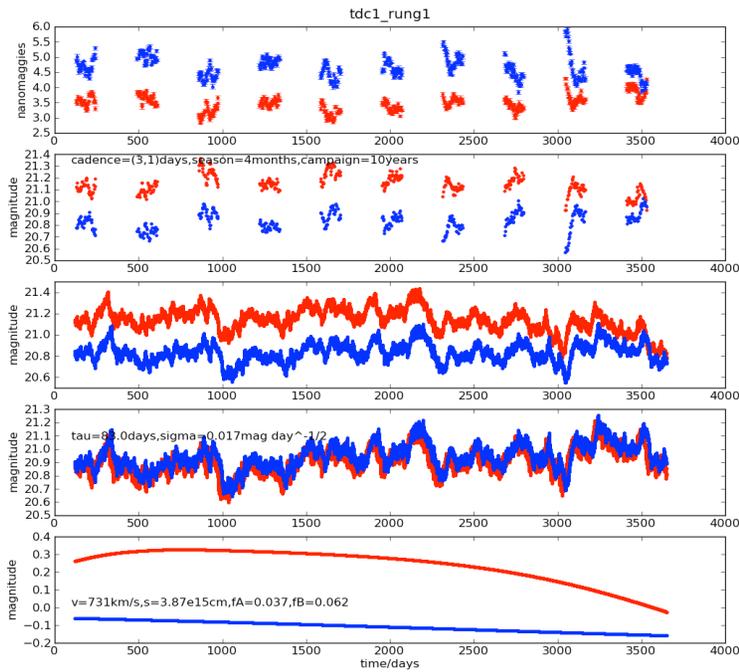
TDC1: challenge “rungs”

Rung	Name	Cbar	Cerr	Season	Campaign	Nepochs	maglim	N_lens
0	COSMOGRAIL	3.0	1.0	8.0	5	400	24	1000
1	UniAll	3.0	1.0	4.0	10	400	24	1000
2	RapidSome	3.0	0.0	4.0	5	200	24	1000
3	FastSome	3.0	1.0	4.0	5	200	24	1000
4	UniSome	6.0	1.0	4.0	10	200	24	1000

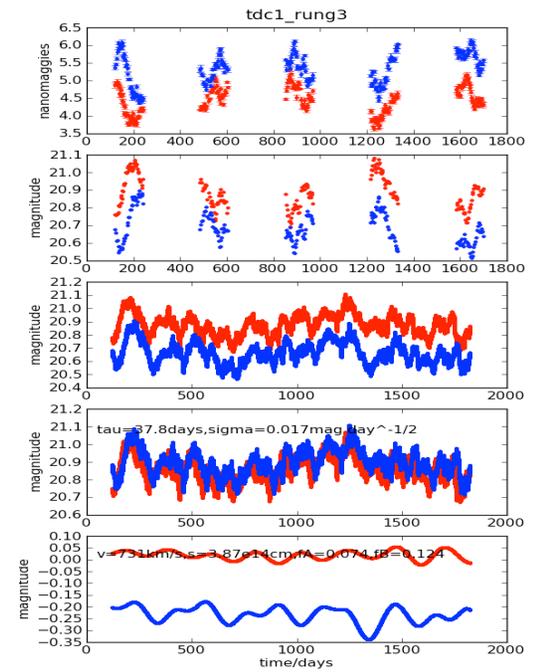
- Rungs enable A-B testing of LSST observing scenarios
 - “Universal cadence”, all filters: cadence = 3 +/- 1 days
 - Emulate combining just “some” filters (eg r+i) 6 +/- 1 day cadence
 - “Fast” and “Rapid” cadences are possible with customisation of observing strategy, as suggested by SNe group - trade campaign length for cadence.
-

TDC1: example lightcurves (Liao)

10 years, 3 day cadence



5 years, 3 days



Mock data

- without noise

- fully sampled

- no lensing

- microlensing

TDC1: status

- Released during this meeting
- Fassnacht & Rumbaugh analysing lightcurves with simple curve shifting algorithm, to enable statistics pipeline to be developed in advance of July 1
- TDC0 feedback ongoing
- New participants welcome any time:

<http://timedelaychallenge.org>

Photometric Redshift Update

Many activities at this meeting:

- New results from the working group
 - New methods of measuring and compactly storing photo-z's (Carrasco Kind)
 - Tests of impact of filter system design (Choyer)
 - Investigations of cross-correlation methods in many domains (Matthews, Rahman, Schmidt) (session joint with LSS)
 - Focus on how to improve photo-z simulation tools ("Franzona", Abate)
-

Photometric Redshift Update

- Session with CosmoSims working group
 - Attempt to scope out what we want from simulations and what's available now
 - Can current simulations provide useful testbed 'data' with realistic SEDs?
 - Session with SN group to compare how we are doing simulations (Gjergo, Abate) and to determine what SN group could use from us
 - short term: $p(z, \text{type})$ simulations for galaxies tagged by properties)
-

Photometric Redshift Update

Snowmass white paper, <http://arxiv.org/abs/1309.5384>

- "Spectroscopic Needs for Imaging Dark Energy Experiments"
 - Scopes out spectroscopic survey requirements for photo-z training and calibration (Photo-z Task H-I)
-

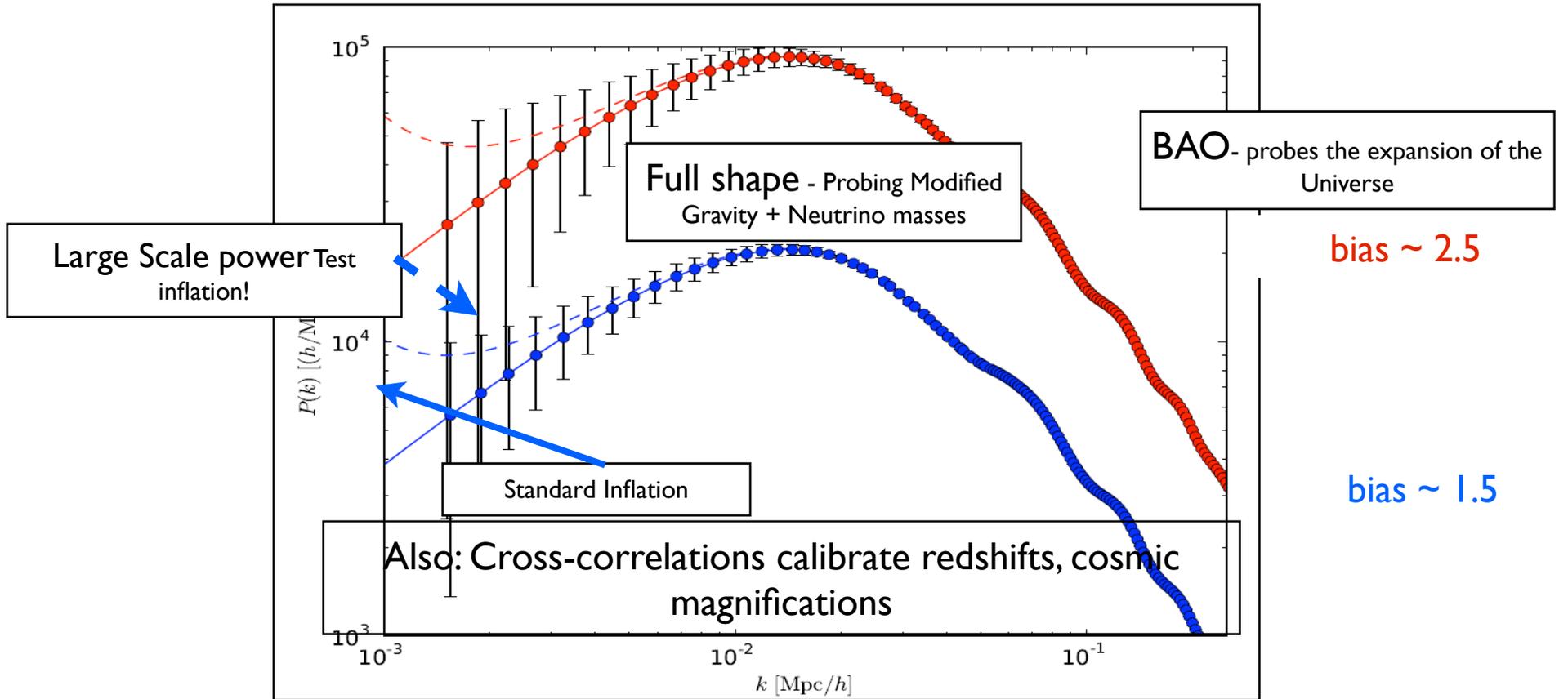


LSST-DESC

Large-Scale Structure Analysis Working Group

LSS WG Convenors:
Shirley Ho (CMU) & Eric Gawiser (Rutgers)

What do we learn from Large Scale Structure ?



What did we **decided to do** as a group 1 year ago?

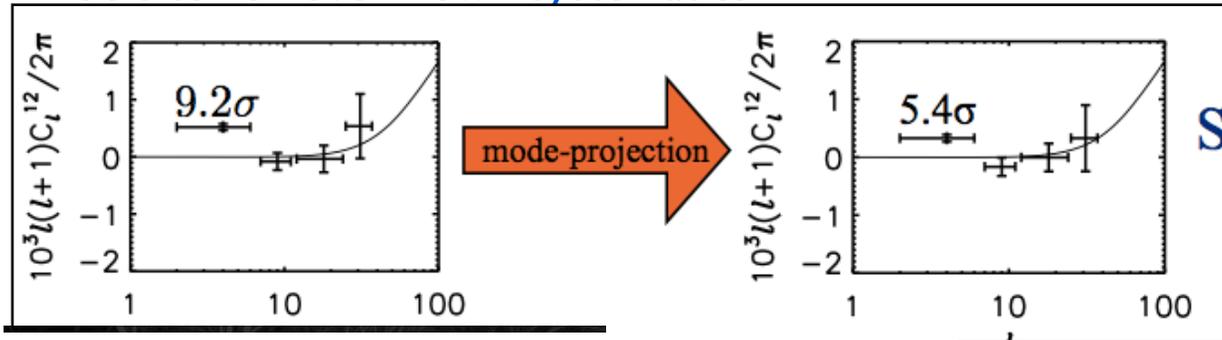
- Tools to remove known Systematics
- Analyze Image Simulations
- Setting Requirements on Systematics
- Scalable LSS analysis software
- Full Sky simulations with OpSim
- Tools to Detect unknown systematics

What have we **done** this year on these tasks ?

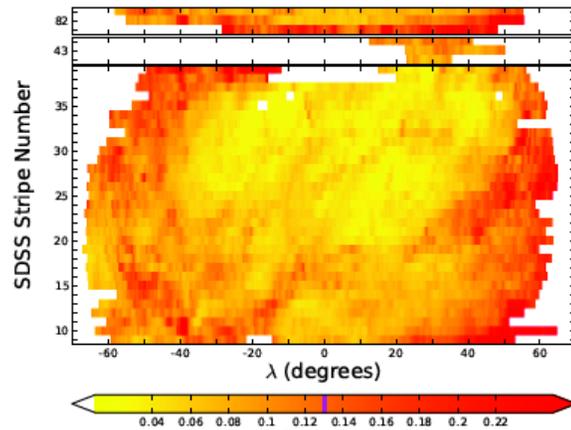
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What have we done this year on these tasks ?

- Tools to remove known Systematics



Credit: Pullen + Hirata 2013



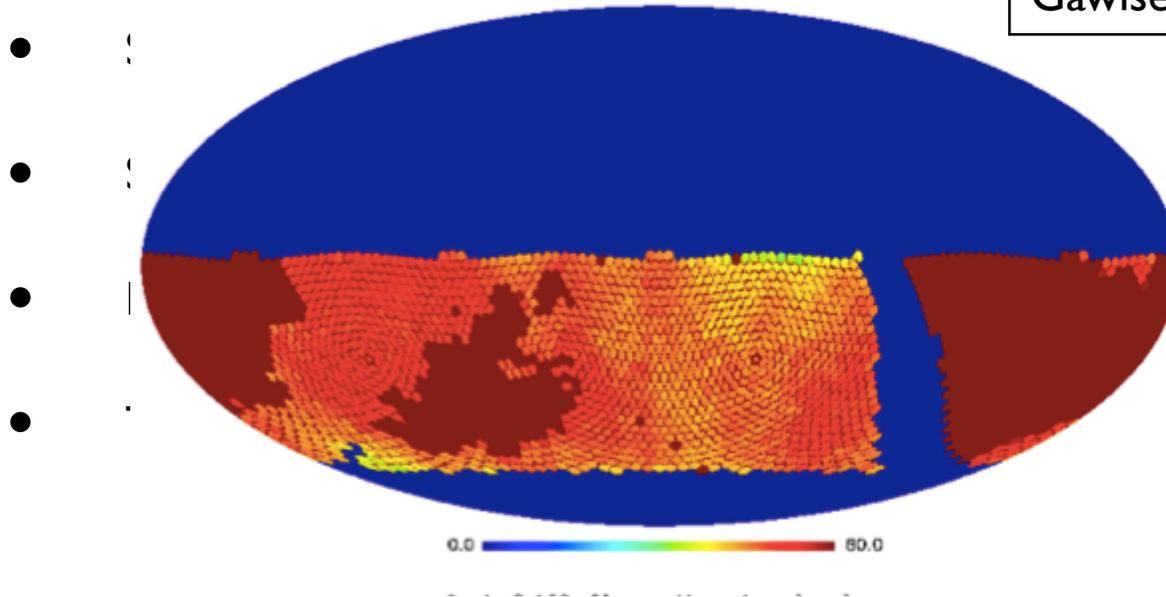
Sim

ste Matias + UIUC group

What have we done this year? on these tasks ?

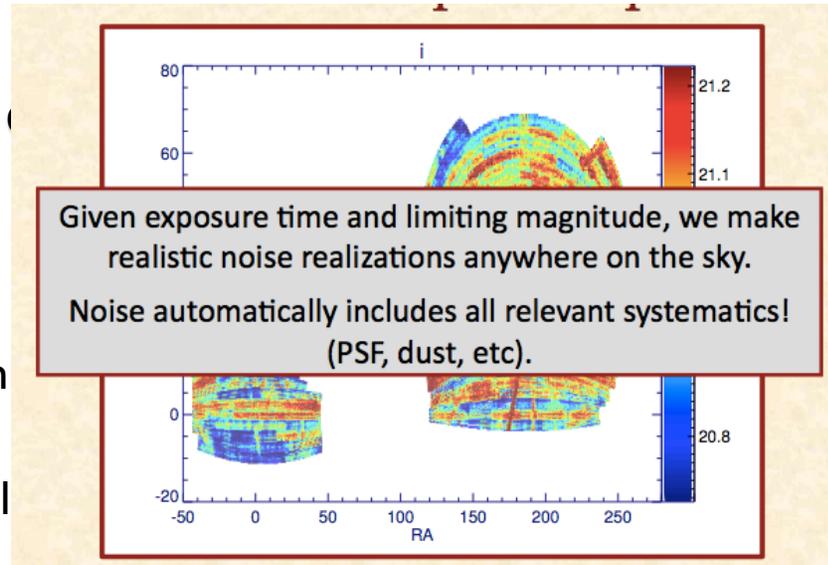
- Tools to remove Unknown Systematics
- Analyze Image Simulations

Gawiser ++



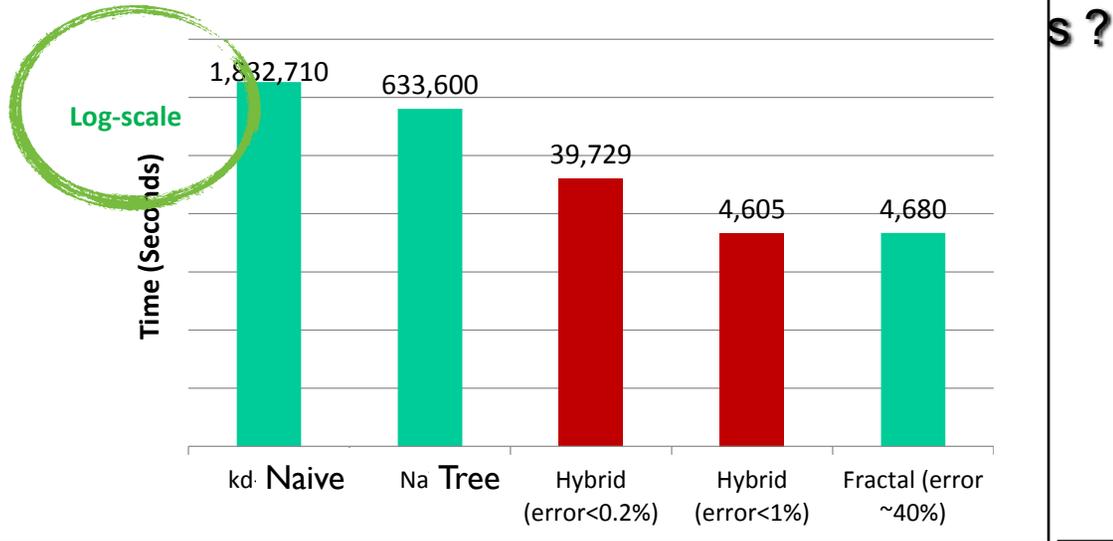
What have we

- Tools to remove Un
- Analyze Image Simul
- **Setting Requirements on Systematics**
- Scalable LSS analysis software
- Full Sky simulations with OpSim
- Tools to Detect unknown systematics



Rozo++

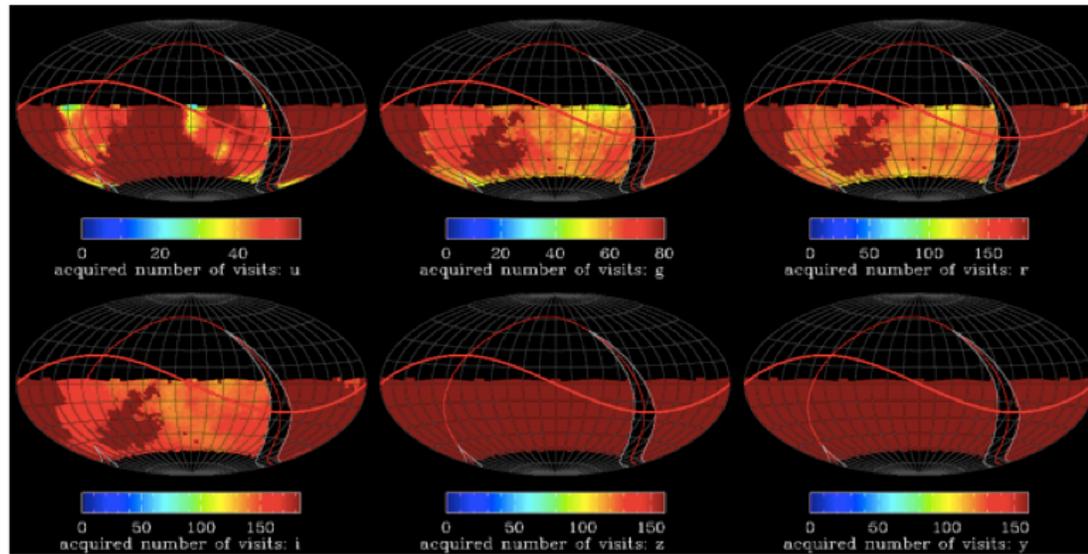
Hybrid Method = Sampling + kd-Tree



- Scalable LSS analysis software
- Full Sky simulations with OpSim
- Tools to Detect unknown systematics

Fu, S.H.+ CMU CS

Task 070 21 Full sky simulations with the Operations Simulator



OpSim output shows number of visits ($\approx \text{depth}^2$) for LSST pointings centered on hexagonal tiling of the sky

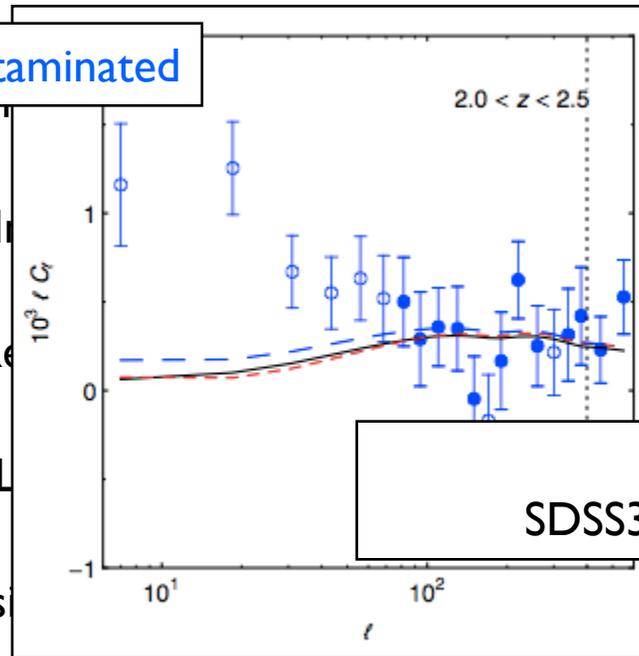
Gawiser++

- Full Sky simulations with OpSim
- Tools to Detect unknown systematics

What have we done this year? on these tasks ?

open circles: Contaminated

- Analyze I
- Setting Re
- Scalable L
- Full Sky s



S.H.,+ Agarwal +
SDSS3-BOSS collaboration, 2013

- Tools to Detect unknown systematics

- Other **cool** things we discovered in the LSS++ meeting:
 - Systematics in observations that affects **photo-z and LSS** ?
 - Should analyze the soon-available LSST DM-stack of Stripe 82 to **test our photo-z, clustering-z, systematic-removal, systematic-detection algorithms**
 - Use **HOD-emulator** ! (talk to Juliana Kwan)
 - Many **machine learning algorithms** applied to various problems: ranging from photo-z, systematics to simulation generations (talk to Matias Kind / me)

Please contact us if you're interested in working on
Large-Scale Structure
(and not already signed up)

Eric Gawiser <gawiser@physics.rutgers.edu>

Shirley Ho

<shirleyh@andrew.cmu.edu>



Papers published (or submitted) by the working group !



Added by [Shirley Ho](#), last edited by [Marc Moniez](#) on Oct 21, 2013

Please post papers by our working group members that are related to the working group (and also those that are cross-working group interests) :

In ascending order of publication date would probably be the easiest order

Papers in preparation (at the draft stage) by the Working Group:

1. ADD YOURS!!

Papers submitted by the Working Group:

1. N. Agarwal, S. Ho, Adam Myers et al. , Characterizing_ unknown systematics in large scale structure surveys, arxiv:1309.2954, addresses task C3
2. ADD YOURS!

Papers written by the Working Group:

1. Anthony Pullen & Chris Hirata, *Systematic effects in large-scale angular power spectra of photometric quasars and implications for constraining primordial non-gaussianity*. PASP 125, 928, 2012 addresses LSS WG task H1
2. X. Xu, S. Ho, H. Trac, J. Schneider, P. Barnabas, M. Ntampaka, *A First Look at Creating Mock Catalogs with Machine Learning Techniques*, ApJ, 772, (2013), addresses Simulation WG task 5.2.1-H-1
3. E. Giusarma, R. dePutter, S. Ho, O. Mena, *Constraints on neutrino mass from Planck and Galaxy Clustering Data* . Phys Rev D , 88, 6, (2013)
4. Q. Wang & H. Zhan, *Mass-dependent Baryon Acoustic Oscillation Signal and Halo Bias*, ApJ 768, L27, 2013, related to task 5.2.1-H-1
5. Alexia Gorecki, Alexandra Abate, Réza Ansari, Aurélien Barrau, Sylvain Baumont, Marc Moniez and Jean-Stéphane Ricol, *A new method to improve photometric redshift reconstruction. Applications to the Large Synoptic Survey Telescope, accepted for publication in A&A*, arXiv:1301.3010
6. ADD YOURS!

Like Be the first to like this

None

LSS Tasks (defined 1 year ago)



Large Scale Structure Task List

Edit Share Add Tools

Added by [Shirley Ho](#), last edited by [Eric Gawiser](#) on Sep 11, 2013 ([view change](#)) [show comment](#)

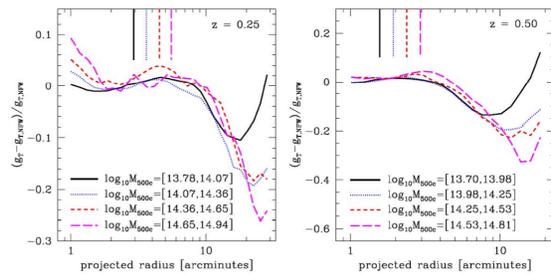
Updated Task List (as seen in the White Paper):

Task	Short Title	Participant 1	P1 Status/Start Date	Participant 2	P2 Status/Start Date	Participant 3	P3 Status/Start Date
H-1	Tools to remove known systematics	CMU (Ho)	Jan, 2013 (with LSST sim, pending DOE funding), already started with SDSS3 data	LAL (Anzari, Moniez)		UC Davis (Wittman, Scranton, Tyson)	Some work in progress 2012 with current sims and DLS data. Most after full ImSim runs with proper mass-galaxy and WL are done. 2013?
H-2	Analyze Image Simulations	UC Davis (Jee, Tyson, Scranton, Wittman, Gee)	After full ImSim runs with proper mass-galaxy and WL are done. Late 2013?	Rutgers (Gawiser, Kurczynski)	April 2014 (pending DOE funding)	UW (Jones)	
H-3	Setting Requirements on Systematics	UIUC (Brunner)	Early 2013 (pending DOE funding), some work in progress with SDSS and DES data	CMU (Ho)	June, 2013 (for LSST: requires pipeline in LT-1, pending DOE funding)	NAOC (Zhan)	Some related work in progress. More to follow starting from April 2013.
LT-1	Scalable LSS Analysis Software	UC Irvine (Kirkby)	Started Sep. 2012	CMU (Ho)	Started Sep. 2012	Argonne (Habib)	Started April 2013, work in progress.
Cross H-2	Full Sky Simulations with OpSim	Rutgers (Gawiser, Kurczynski)	Started Sep. 2012 HEALPix pipeline in place. Initial results show that large telescope dithers are needed for LSST survey uniformity.	UW (Jones, Yoachim)			
Cross H-3	Tools to Detect Unknown Systematics	CMU (Ho)	Jan,2013 (with LSST sim, pending DOE funding), already started with SDSS3 data	UC Davis (Thorman, Tyson)	Started 2012		

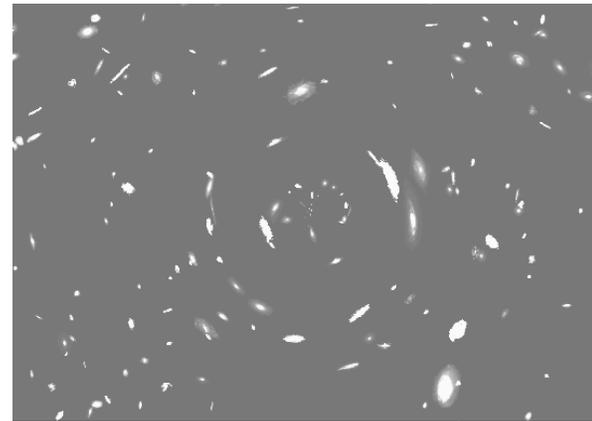
DESC Clusters group report

Very productive meeting— **thank you** to Pitt/CMU and all the local organizers!

There really is no substitute for in-person meetings.



Becker & Kravtsov 2011



Significant progress within group

EXAMPLES:

- Defined a new set of simulations for the March 2014 highlight release, isolating measurements of lensing signal at fixed distortion level. (Will help improve accuracy of current cluster shear measurements.)
- Determined priorities for the next round of cluster shear simulations.
- Made important advances towards understanding how best to model cluster shear profiles and robustly measure cluster masses.
- Can expect the above to have an important near-term impact on cluster cosmology constraints!

... and just as important

Cross-group discussions lead to progress:

With simulations group, for example:

Process for obtaining and analyzing required ray-traced cosmological simulations (thanks to Becker, Wechsler et al.)

Process for provision of improved mass functions, spanning required mass/redshift/cosmology range (thanks to Heitmann, Habib et al.)

Also productive discussions with weak lensing, strong lensing, and photo-z groups.

High bar for the next meeting!

Thank yous!

Cindy Cercone: all the administrative support!

The University Club staff: for all their help throughout the conference

Volunteers: Timothy Licquia, Kara Ponder, Abhishek Prakash (U. Pitt)

Nishant Agarwal, Arun Kannawadi, Melanie Simet, Sukhdeep Singh, Mariana Vargas-Magana (CMU)

PITT-PACC (U. Pitt) and the McWilliams Center (CMU): for providing the funds to make this meeting possible and affordable